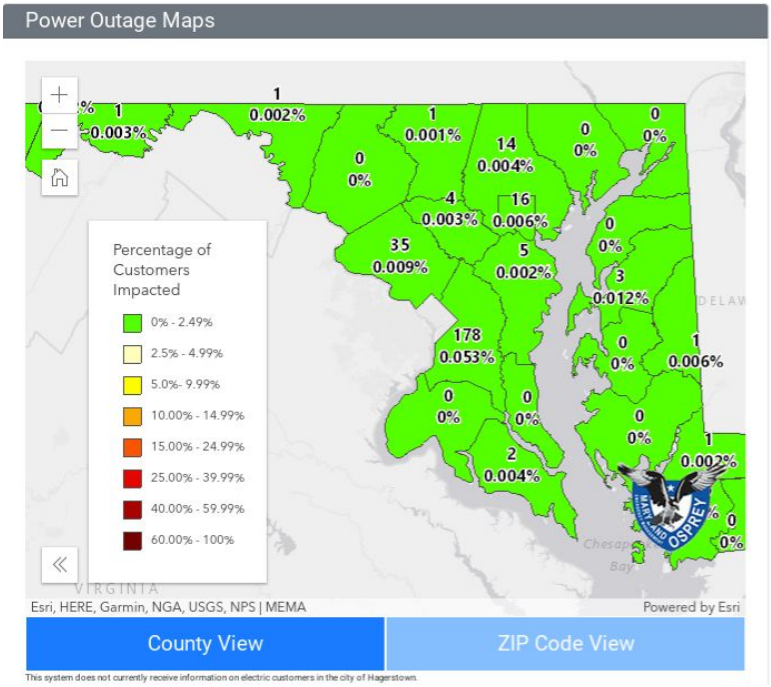

State Wide Power Outage Application

https://mema.maryland.gov/Pages/PowerOutagesData.aspx

State of Maryland – Department of Information Technology

Category: Cross-Boundary Collaboration & Partnerships

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The Statewide Power Outage application provides a comprehensive near-real time view of power outages across maryland

Executive Summary

The Statewide Power Outage application provides a comprehensive near-real time view of power outages across Maryland. Through a partnership between the Maryland Emergency Management Agency (MEMA) and the power providers in Maryland, the Maryland Department of Information Technology was able to develop an application that consumes power outage feeds from each provider and aggregate that data in both maps and charts that update as the data in the feeds change.

An estimated power outage count is first displayed for users as they open the webpage. The maps display the data at both the county level and ZIP code level. Data is displayed by the number of outages at the ZIP code level and by percentage of customers impacted at the county level. The charts display power outage data for the number of customers impacted, percent of customers impacted, and customer outages by county These charts also provide flexibility to display the outage data for the previous 24 hours, 5 days, or 2 weeks. The application also allows users to see when the power outage feeds from providers are not functioning or contain stale data.

This application is exemplary because it provides a statewide view of data that is generated locally and regionally by consolidation of disparate data feeds. The application also displays data in near-real time, which is critical for an agency such as MEMA, that is tasked with responding to events that are critical or emergency in nature. The application provides a wealth of data to MEMA and the citizens of Maryland. Citizens can view power outages in and around their homes, see how events are impacting their power providers, and view the recovery of power utilities in the area after an event such as a storm.

Concept

The motivation behind developing the system was a request from MEMA to overhaul the existing Power Outage application. In summary, the request was to improve the user interface and add additional power provider feeds. The system was intended to improve power outage information for MEMA operations and for the citizens of the State. It provides a macro and micro view of power outages at any given time across Maryland. The application was also built with the intent of using as many Commercial Off The Shelf (COTS) products as possible for easier maintenance and future improvements.

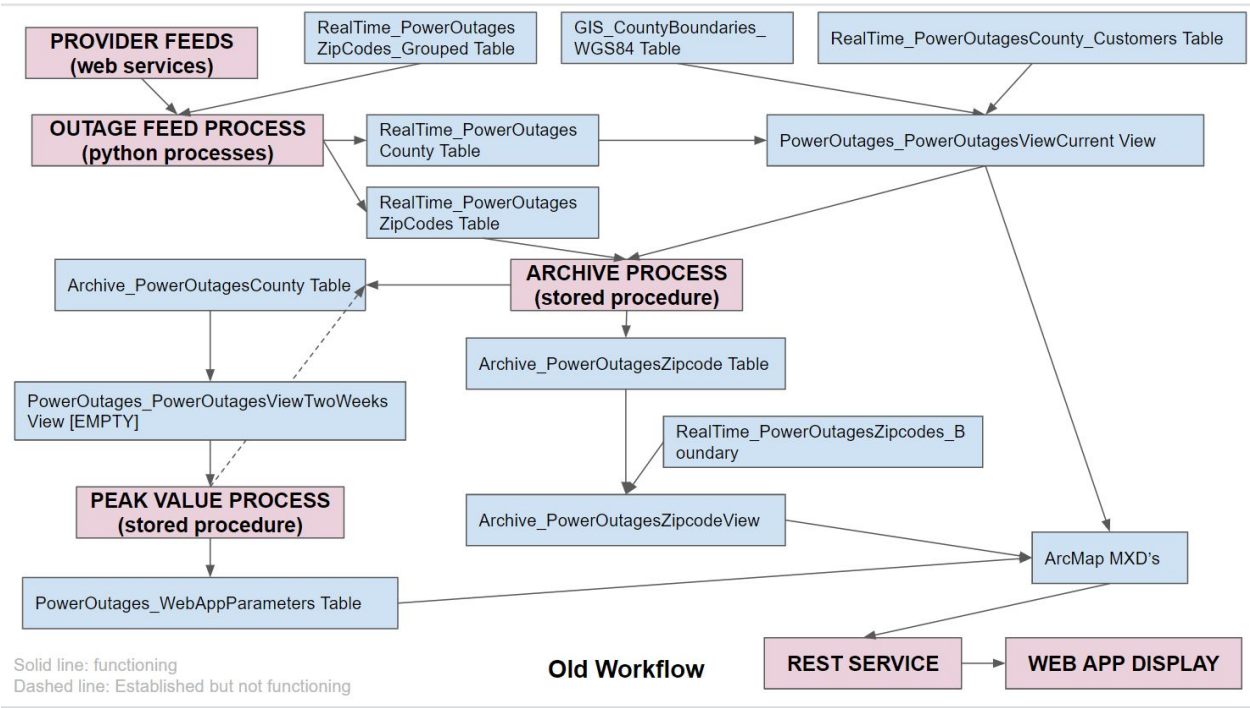
One unexpected benefit was that through exploring some of the providers data feeds, we found issues with the underlying data they were providing for us to consume. We were able to relay that information back to the providers, who were able to work with their vendors to correct the issues with the source data.

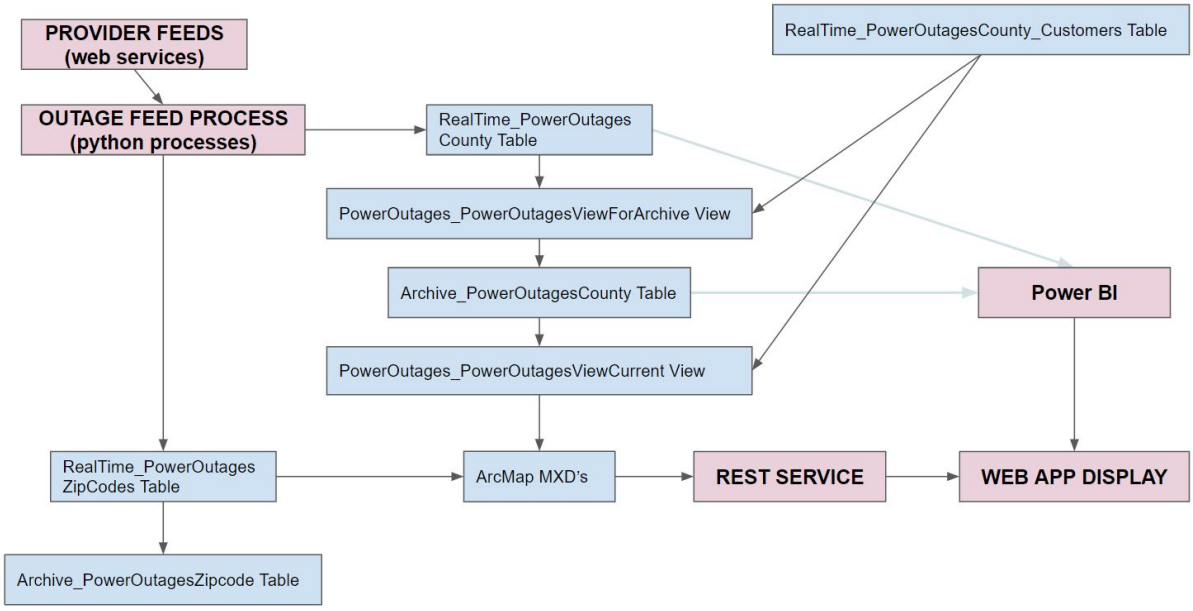
What differentiates this system from other similar systems is the ability for the system to take data from many different provider feeds with different data schemas and formats and aggregate it for display accurately differentiates it from similar systems. In general, all of the power providers have a webpage that displays the data for their own customers in the areas they serve, but this does not provide a complete picture across the state. This system also displays historic data to give an idea how incidents were responded to with respect to the recovery of power utilities.

This system serves both MEMA and the public. The system provides both with up to date information on power outages throughout the State. This provides great transparency to citizens as to the current state of utilities in their area and how the recovery of those utilities are happening over time. MEMA uses this information internally both during steady state operations and during State Emergency Operations Center (SEOC) activations to monitor power outages daily and during emergency events. The Military Joint Operations Center (MJOC), which is the military component of MEMA, received notifications as to when the power providers data feeds are not responding or if the data is stale. They can use this information to send out notifications to the appropriate stakeholders about the current situation. The application also provides direct links to the power providers outage map websites and their storm response websites.

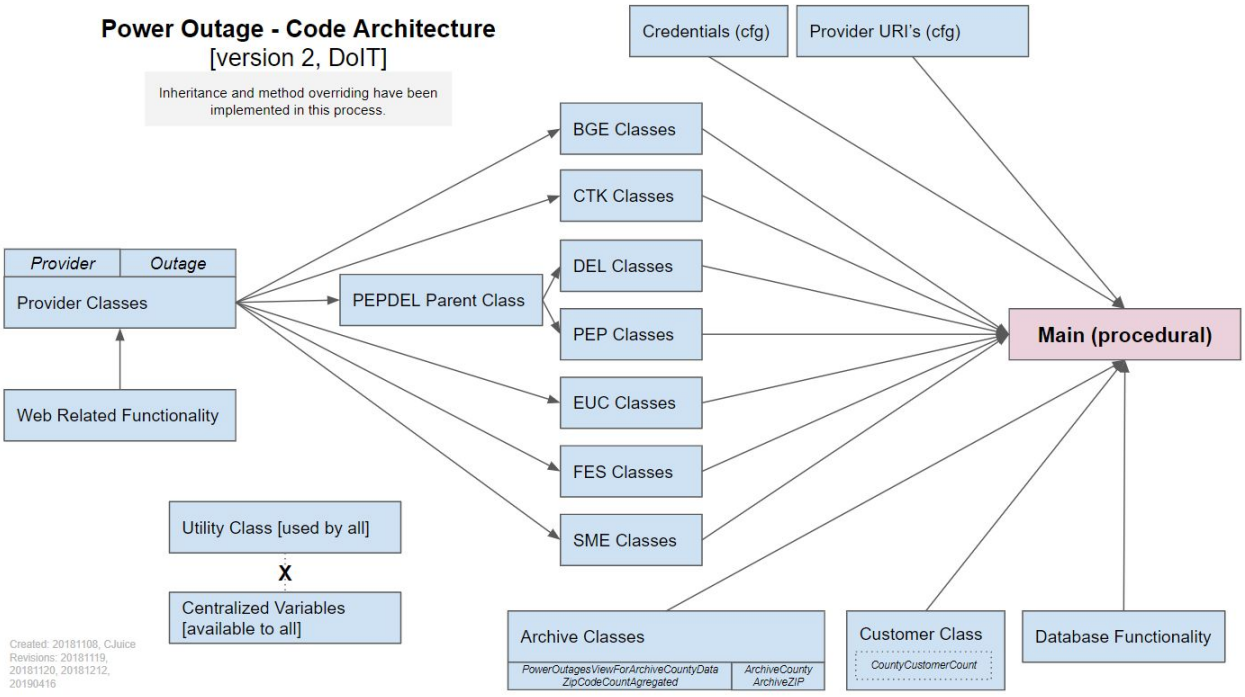
Implementation

During the development and implementation of the new application there were four phases. Phase 1 of the system focused on reverse engineering the existing application. We needed to understand what the existing data feeds were and how the data was being processed and aggregated in the database. This included reviewing all the existing Python scripts pulling the data from source feeds, reviewing database table structure, and reviewing database stored procedures. Phase 2 focused on redesign of some of the existing processes and new data feeds. During phase 1, we discovered there were several processes that were not fully automated or were wasteful which included unnecessary processing steps. We also were able to add in additional power provider feeds to the process. Phase 3 focused on redesign of the user interface. This included publishing new GIS web services to support the map functionality and integrating Microsoft Power BI with the backend database for the charting functionality. Phase 4 was deployment of the new application.





New Workflow



There were some modifications made to the original system design. The modifications were implemented to support differences in each providers data feed. Some of the providers used a zero value to show that there were no power outages in a ZIP code, others used a null value, and some did not even include a value. We had to manipulate the data to make sure we were accounting for the variety of ways the data was represented to show no outages. An additional modification we needed to implement was to account for non-Maryland jurisdictions in the totals for both customer count and power outage count. Some of the providers also served customers in Delaware and Washington DC. Those customers and power outages needed to be excluded from the process totaling values.

Impact

MEMA operations and decision making is being affected from using this application. MEMA staff can quickly see spikes in outages anywhere in the state. After they have identified a power outage spike in a specific location, they can perform outreach to power providers and local government to inquire about the outage and provide state assistance and support if needed.

The quantitative and qualitative impacts of the system can be seen from multiple perspectives. The previous system used a static table of customer counts from providers that was updated on a periodic basis. This method of obtaining customer counts meant that as a provider gained or lost customers, those changes were not being incorporated on a real-time basis. The system now pulls the customer count from each provider feed for each jurisdiction, which means a highly accurate count of customers as it relates to the number of outages and provides a much better data product for end users. The rebuilt system was also able to account for providers that serve the same ZIP code. This increases the accuracy of the data, whereas the previous system did not always capture feeds from multiple providers within the same ZIP code.

The application has become part of a suite of situational awareness tools MEMA uses during steady state and enhanced operations. They are able to leave the application up and running on a large screen in their Emergency Operations Center (EOC) and it will update in real-time. They can also rely on the quality of the data being provided to them. Additionally, changes to the user interface can be made much

quicker and easier because they are COTS products instead of fully customized solutions.